City of Santa Barbara

2017 Annual Energy Report

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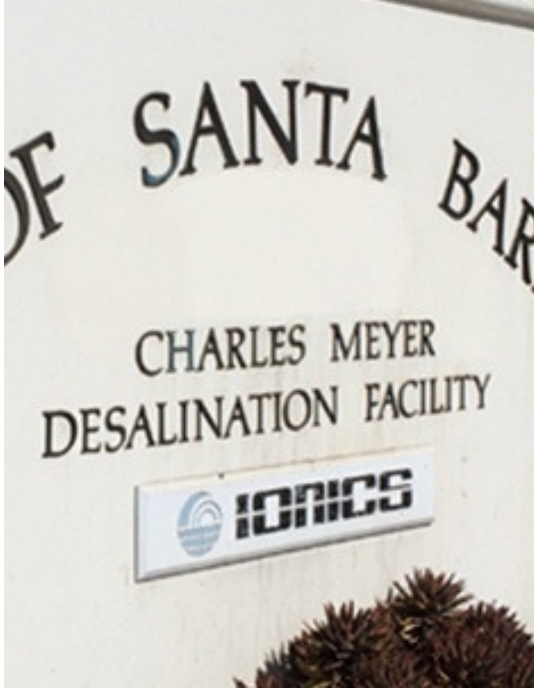

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The City of Santa Barbara is committed to a sustainable future.

This includes the responsible stewardship of resources and the demonstration of leadership in sustainable organizational practices. The City pursues its goals through the wide-spread adoption of energy efficiency practices, the deployment of renewable energy resources and engaging stakeholders through collaborative strategic planning.

Energy Highlights 2017

- 100% Renewable Goal: City Council adopted a goal to use 100% renewable electricity by 2030 for both municipal buildings and the community as a whole. It also established a goal of 50% renewable electricity for municipal facilities by 2020.

- Zero Net Energy Roadmap: the City received funding from the California Energy Commission to develop a Zero Net Energy Roadmap to assess steps and projects to get Municipal buildings to zero net energy use.

- Energy Efficiency Savings: the City has saved almost 770,000 kWh annually since it began its energy efficiency program in 2008. That is equivalent to taking over 600 cars off of the road!

Introduction

The City has long been a sustainable energy champion. In 2017 the City Council took this position to the next level by committing to a 100% renewable electricity goal by 2030 (including an intermediary goal of 50% for municipal facilities by 2020). This bold commitment underscores the City's position on the importance of clean energy resources.

Additionally, Fiscal year (FY) 2017 was the first year that the Utility Management Program was fully operational, centralizing General Fund utility payments and establishing an energy efficiency revolving fund. The fund's overall budget for utility payments was $1.27 Million and an additional $25,000 was given to the fund as seed money to put toward energy efficiency projects and several high yield project were completed.

The Charles Meyer Desalination plant officially started producing water in late FY17 and the energy team has been monitoring the increase in energy usage and strategizing on how to offset this significant increase in energy usage in future years.

Lastly, the energy team applied for and received funding from the California Energy Commission to undertake a Zero Net Energy Roadmap and Implementation Plan which will begin in FY18 and will assess and evaluate all occupied City buildings for a path to net zero energy usage.

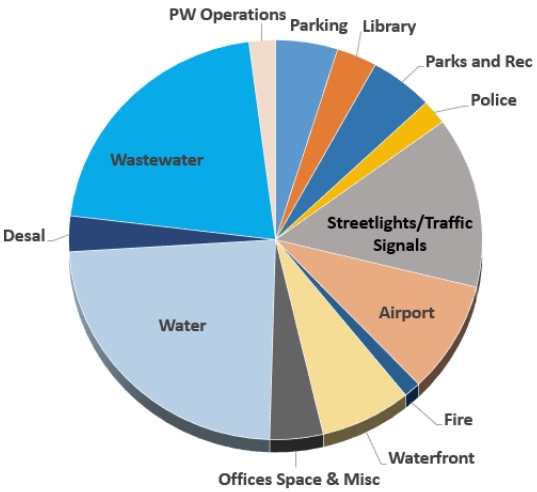
Electricity

Electrical Expense

In Fiscal Year 2017 (July 2016 through June 2017) the City spent $3.63 million on electricity. This amount was approximately 5.6% lower than the previous year. At the end of FY16, the Energy Team conducted a comprehensive rate audit which explains why electrical costs went down even though usage went up.

This rate study looked at the tariff that each electrical account was on to confirm that it was the best rate for the type of usage. For example, the audit found that the De La Guerra Plaza was on a general service tariff but should have been on a streetlight tariff.

FY 2017 Electrical Expense



Total Electrical Spend $3,630,428.11

*About 5.6% decrease over 2016

This change alone decreased the electrical bill at this account from $5,000 per year to $800 per year, even though the usage was the same.

Purchased Electricity

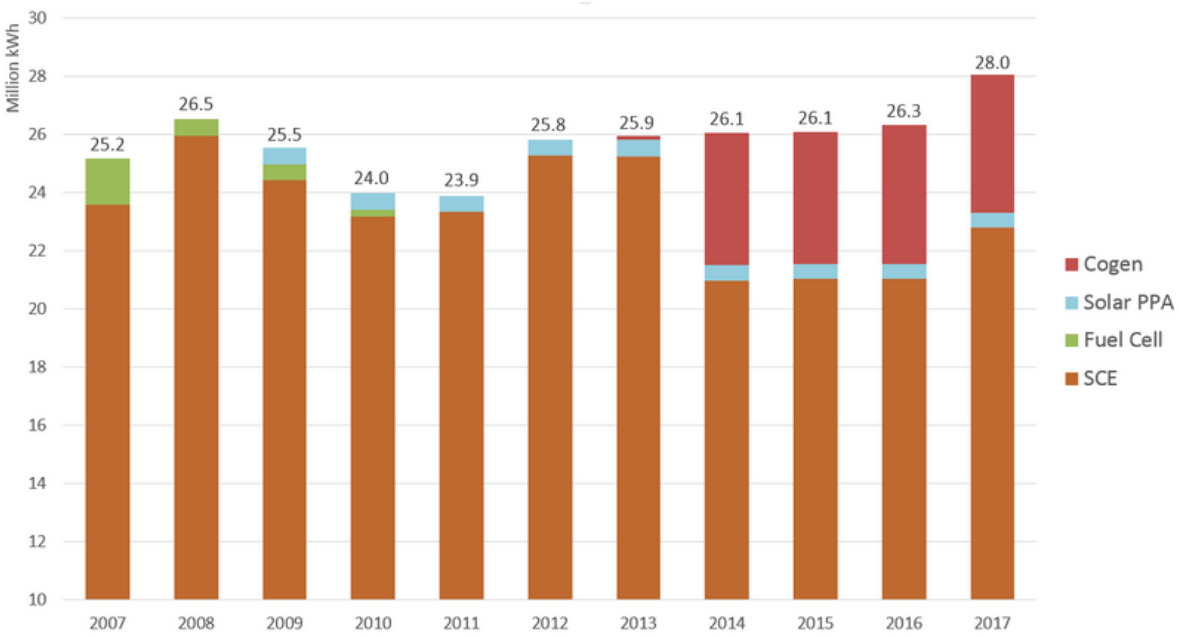
In fiscal year 2017 the City purchased just over 28 Million kWh, which was a 6% increase over the electrical usage in 2016.

The Charles Meyer Desalination Plant launched in April of 2017 and was a significant contributor to that increase even though it only ran for the last three months of the fiscal year. In future years, desal is expected to increase energy use even more significantly.

Improvements were also made at the Skofield Pump Station where aeration was added to the process to improve water quality, but also increased the facility's energy use. Lastly, the City continues to add streetlighting throughout the City which improves safety and security.

Unlike 2016, groundwater played a less significant role in the City's water supply. Four of the largest electrical decreases were groundwater wells that saw less activity due to a wetter season. Overall, groundwater wells saw a 20% decrease in electrical usage.

Purchased Electricity



2017 Purchased Electricity by Source

Biggest Electrical Users

Water & Wastewater: Water and wastewater treatment continue to be the City's largest electrical load. The Energy Team has undertaken many energy efficiency efforts within these systems but the bottom line is that water treatment is a tremendously energy intensive process. This area grew slightly this year and will grow significantly in the coming year with the recommissioning of the desalination plant. In FY17 the Desal increased the City's electrical usage by approximately 8%. When the system is fully operational it is anticipated to increase City electrical usage by approximately 50%.

Streetlighting: Streetlighting also continues to be a significant load. Staff will be upgrading the majority of City-owned streetlights to LED in 2017 and 2018 and have arranged with Southern California Edison (SCE) to have all of the utility-owned streetlights upgraded as well. This will save the City 30-50% on streetlighting costs. The SCE project is anticipated to take place in June of 2018.

Marina 1 and the Airport Terminal are large accounts due to the volume of customers they serve and infrastructure needs. This is especially true at the Marina, which includes roughly 10% liveaboards, contributing to higher energy usage at this facility.

Waterfront staff is currently working on a submetering project at this marina to better measure and manage the electrical usage at each slip.

Marina 1 - One of the City's biggest electrical users

2017 Biggest Electrical Users

Location	2016 Annual kWh	2017 Annual kWh	% Change
El Estero WWTP (Desal)	7,350,634	8,767,223	▲ 19%
Cater Water Treatment Plant	2,422,829	2,537,248	▲ 5%
Streetlighting	2,051,105	2,040,806	★ 0%
Airport	1,842,964	1,841,275	★ 0%
Marina 1	856,440	883,98	★ 0%
Ortega Groundwater Plant	926,388	751,957	▼ 19%

Largest Electrical Decreases

Facility / Account	Percent Decrease over 2016
Alameda Well	▼48%
Ortega Well	▼19%
Los Robles Well	▼30%
Corporation Well	▼20%
Granada Garage	▼22%

Largest Electrical Increases

Facility / Account	Percent Increase over 2016
El Estero / Desal	▲ 19%
Rocky Nook Pump Station	▲1,365%
El Cielito / Skofield Pump Station	▲160%
Marina 4	▲ 9%
Hope Well	▲ 18%

The Water-Energy Nexus

In 2017 there was a brief relief from the long-term drought in California and the City was able to decrease groundwater production at various City wells.

Four of the City's larges electrical decreases were groundwater wells and overall groundwater wells saw a 20% decrease over 2016.

There were increases at a few groundwater pumping facilities, however, including the Rocky Nook Pump Station which had to take over some of the water distribution load pumping water up to tunnel reservoir when other pumps were compromised. This resulted in a 1,365% increase at this pump station which is otherwise minimally used.

Additionally, aeration was added at the El Cielito/Skofield pump station to improve water quality which also resulted in a 160% increase in electrical use at that location.

Impacts of Desalination

In 2015, in response to exceptional drought conditions, the Santa Barbara City Council voted unanimously to reactivate the Charles E. Meyer Desalination Facility (desal). The facility acts as an emergency water supply and can produce up to 3,125 AF per year.

Though the facility will hedge against future water shortages, it will also add a significant electrical load to the City's facility inventory.

The system only ran for the last three months of FY2017, at an increased electrical usage of approximately 1.6 Million kWh. In future years it is anticipated that this system will use up to 13 Million kWh per year when fully operational (a 50% increase over the City's total load).

City staff are looking at ways to offset this additional load, added costs and increase in GHG emissions. Renewable energy generation is one of the most attractive measures, though it would take approximately 20 Acres of solar panels to offset this increase.

Charles E. Meyer Desalination Facility

Available Roof Space for Potential Solar near the desal plant

Our Road to 100% Renewable

In June, 2017 the City Council took bold action and adopted a 100% renewable electricity goal. The goal states that 50% of electricity used by municipal facilities will be from renewable sources by 2020 and 100% of electricity used by municipal facilities AND the community as a whole will be from renewable sources by 2030.

This is an ambitious goal and will require a closely coordinated approach between the City, the energy provider and local community members.

The City is always exploring opportunities for expanding its renewable portfolio with local renewable energy resources and continues to do so. Currently the City is planning to build a 900kW solar array the the airport's long term parking lot and is considering the addition of a 200kW array at the City Parking Lot 7 which will serve the parking lot and the adjacent Central Library.

In order to identify more of these opportunities and to closely coordinate these projects with energy efficiency efforts, as well as policy and programmatic offerings the City will look to hire a consultant to assist in putting together a Strategic Energy Plan that will provide a holistic approach to achieving 100% renewable electricity. This plan is expected to be complete in early FY19.

More information on opportunities and constraints that exist to help or hinder the City meeting this renewable goal, see Appendix 2.

Santa Barbara City Council Meeting and the Adoption of the 100% Renewable Goal.

Why Not 100% Renewable Gas?

You may have noticed that this report calls out 100% renewable electricity specifically and wonder why gas is not included. The short answer is that it can still be challenging to convert natural gas systems in existing buildings to all electric.

Additionally, a large component of meeting the goal is the possibility of adopting Community Choice Energy (CCE) which would give the City the option to source a higher percentage of renewable electricity. At present there are no CCE options for natural gas. Additionally, natural gas is a much smaller component of energy use in Santa Barbara.

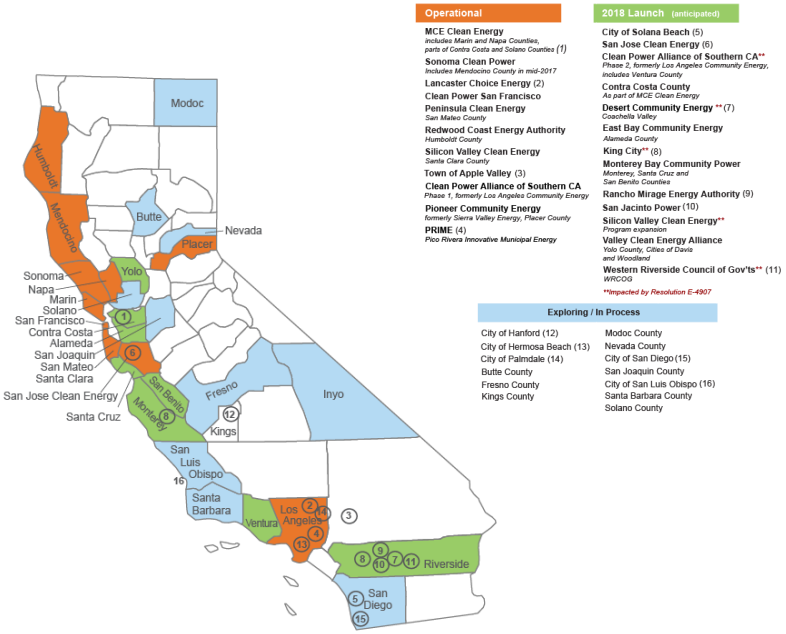
Community Choice Energy (CCE/CCA)

Community Choice Energy (CCE), also known as Community Choice Aggregation, enables local governments to leverage the purchasing power of their residents, businesses, and governmental entities to purchase or generate power for their communities.

When the State of California deregulated the energy market in 1997, many Californians switched to energy providers other than the investor-owned utilities due to an increase in competitive pricing and other offerings.

Following the energy crisis of 2000-01, state regulators removed the ability of a consumer to choose electricity providers. As a response to the closing of the open market, Assembly Bill 117 was passed in 2002, establishing CCE.

There are currently 11 active CCEs throughout the state and many more in the process of forming. The City joined the County effort to explore feasibility in our area and is continuing to look at program options locally.

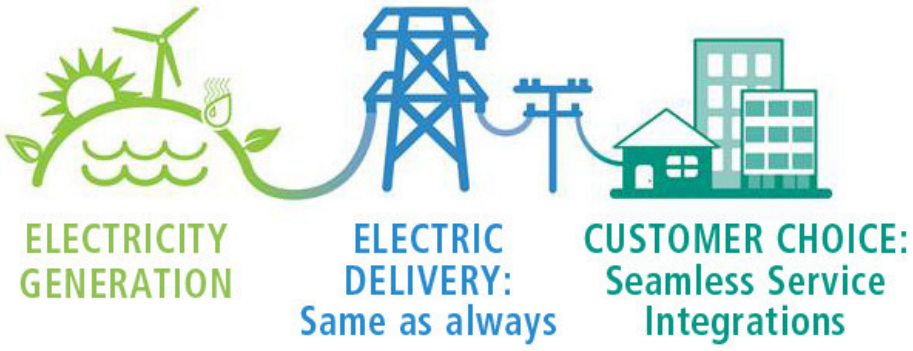


Benefits of CCE

CCE gives energy purchasing and pricing options to local decision-makers and allows the community to determine what type of energy mix (and what percentage of renewable resources) would best serve its needs.

In many cases, existing CCE programs around the state have been able to offer energy with a higher renewable energy content at rates that are competitive with the existing utility's rates and often include increased renewable content.

Because a CCE operates as a local non-profit, as opposed to Investor-Owned Utilities, CCE revenues can also be reinvested in the community in the form of clean energy projects and incentive programs, which can spur local economic opportunities.



Community Choice Energy: Energy Flow Chart

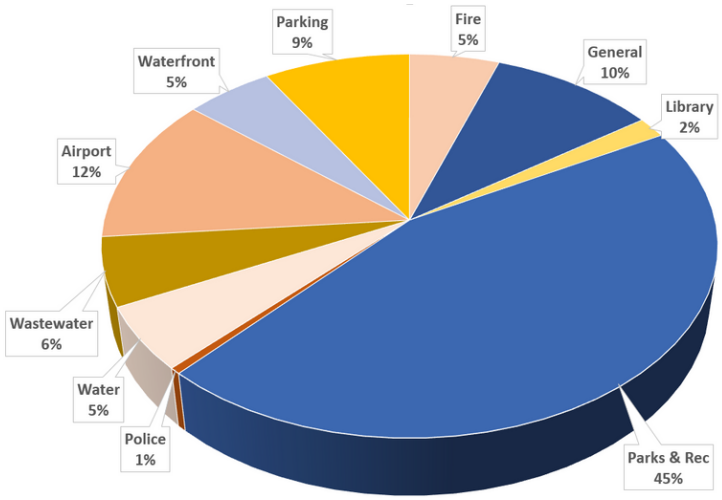
Natural Gas

Natural Gas Expense

In Fiscal Year 2017 (July 2016 through June 2017) the City spent $148,500 on natural gas. This represented a 9% increase over the previous year, likely due to the colder winter temperatures experienced in late 2016 requiring more pool and building heating.

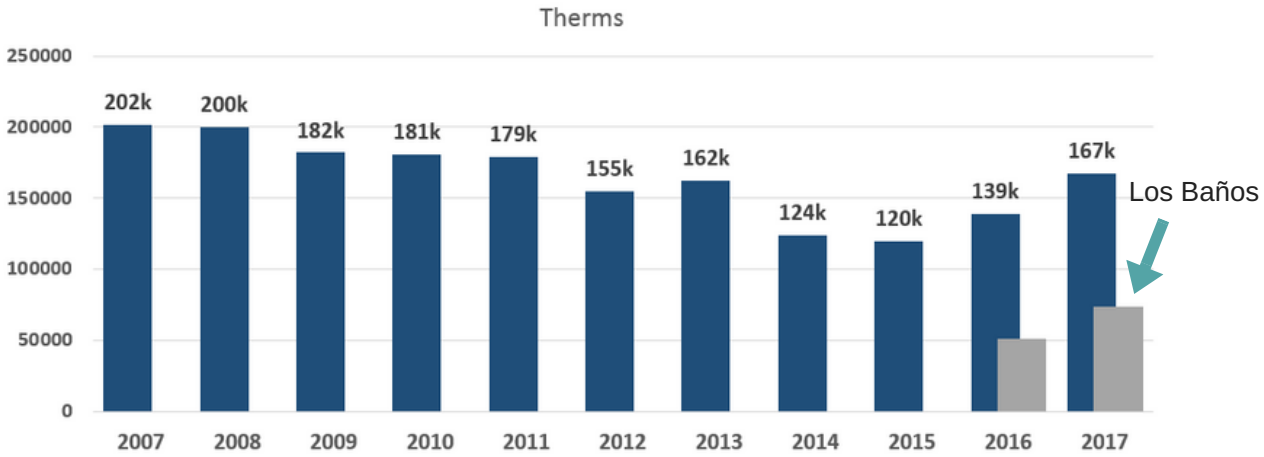
As in years past, pool heating remains the City's largest use of natural gas. The Los Baños Del Mar pool saw a 46% increase in gas usage in 2017, again likely due to the cooler temperatures and increased rain. The City's overall gas usage went up approximately 21% over 2016.

FY 2017 Natural GasExpense



Total Natural Gas Spend $158,500

*About 9% increase over 2016



Natural Gas Use by Year

Renewables

Renewable Electricity in City Operations

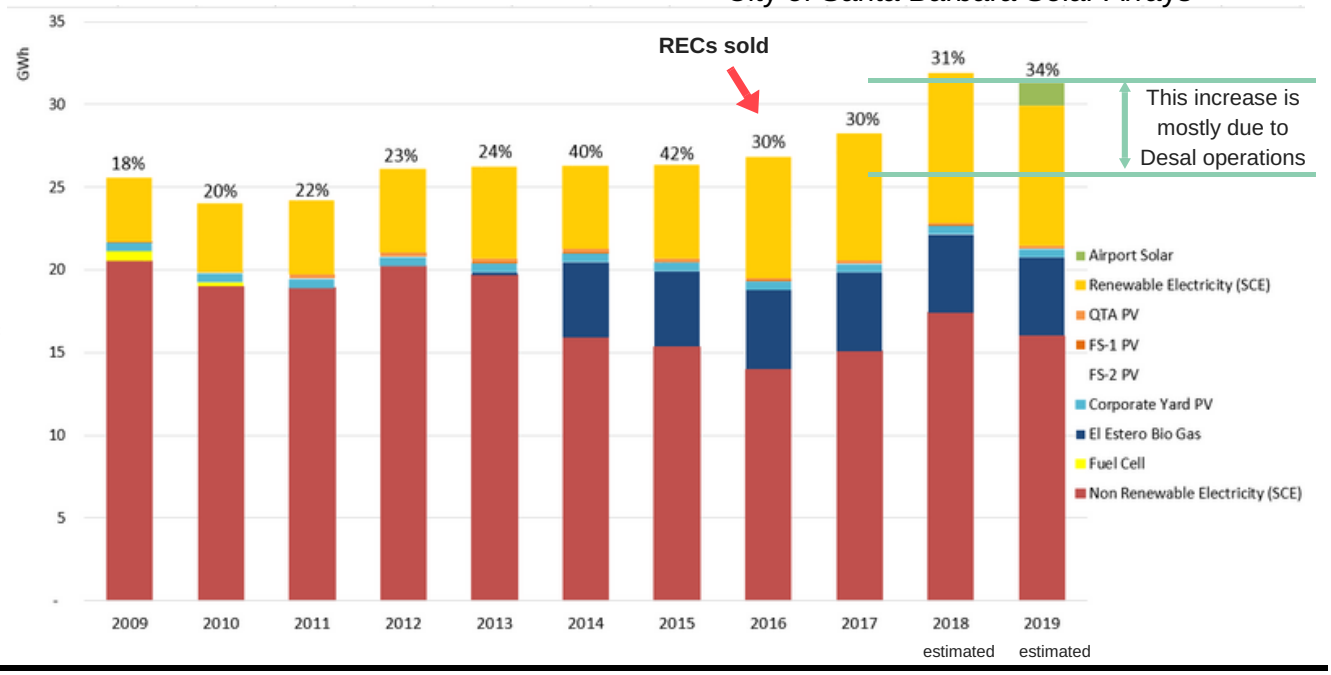
The City can claim 30% of the electricity it uses as "renewable", even though we generate 5.651 MWh of electricity per year (approximately equivalent to 20% of the City's usage). The City did not retain the renewable energy credits (RECs) to the Hydro and Cogeneration Facilities and therefore cannot claim that as renewable power (see Appendix 3 for more information on the City's renewable generation).

This renewable power comes from a combination of solar power production, owned by the City and the renewable portion of Southern California Edison's power mix. For more information on RECs, see Appendix 1.

City of Santa Barbara Solar Arrays	
Corporate Yard	302 kW
Airport QTA	190 kW
Fire Station 1	10 kW
Fire Station 2	15 kW

City of Santa Barbara Solar Arrays

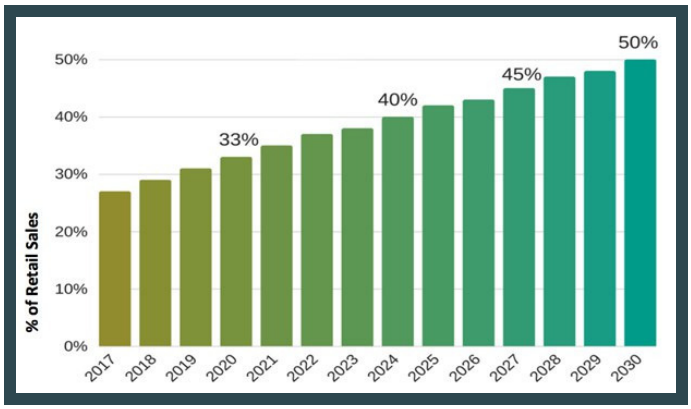
Renewable Percentage of Electricity **used** in City Operations



Potential Energy Efforts to Increase Renewable Portfolio

The energy Team is always looking for new opportunities to expand the City's renewable energy portfolio. This list below outlines opportunities identified by the Team for future implementation or exploration. Some are currently underway while others are only in the very nascent stages of exploration.

- Airport Solar (900kW) - currently in design
- Garage Solar (up to 600kW)
- Energy Efficiency (estimated 500,000kWh)
- Additional Cogen (300 kW)
- Floating Solar on reservoirs
- Renewable Portfolio Standard = 50% by 2030 (SB350)
- Purchase Cogen (or other) RECs (3MWh)

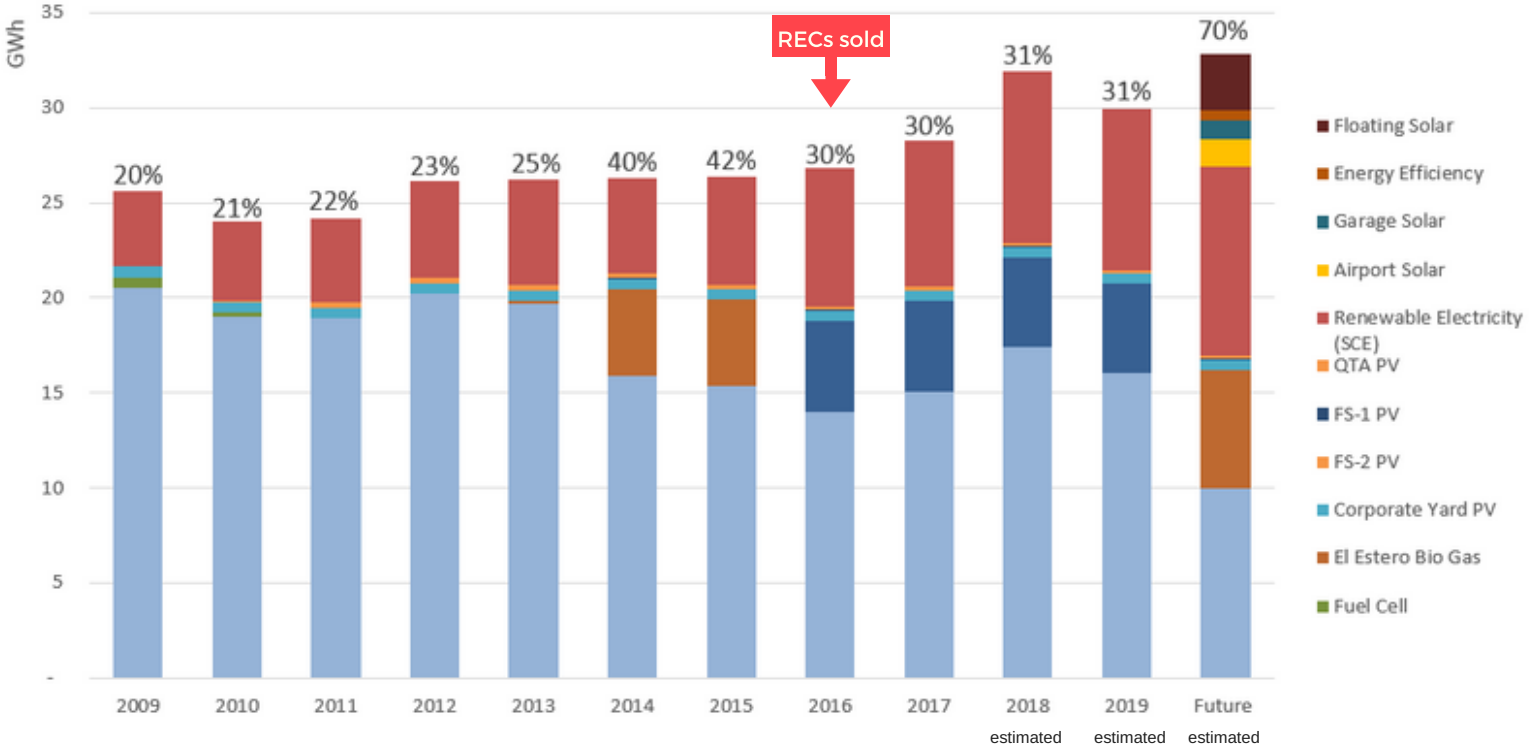


California Renewable Portfolio Standard

% of electricity required to be from renewable resources

Sonoma Floating Solar

Renewable Percentage of Electricity in City Operations with **Potential** Projects

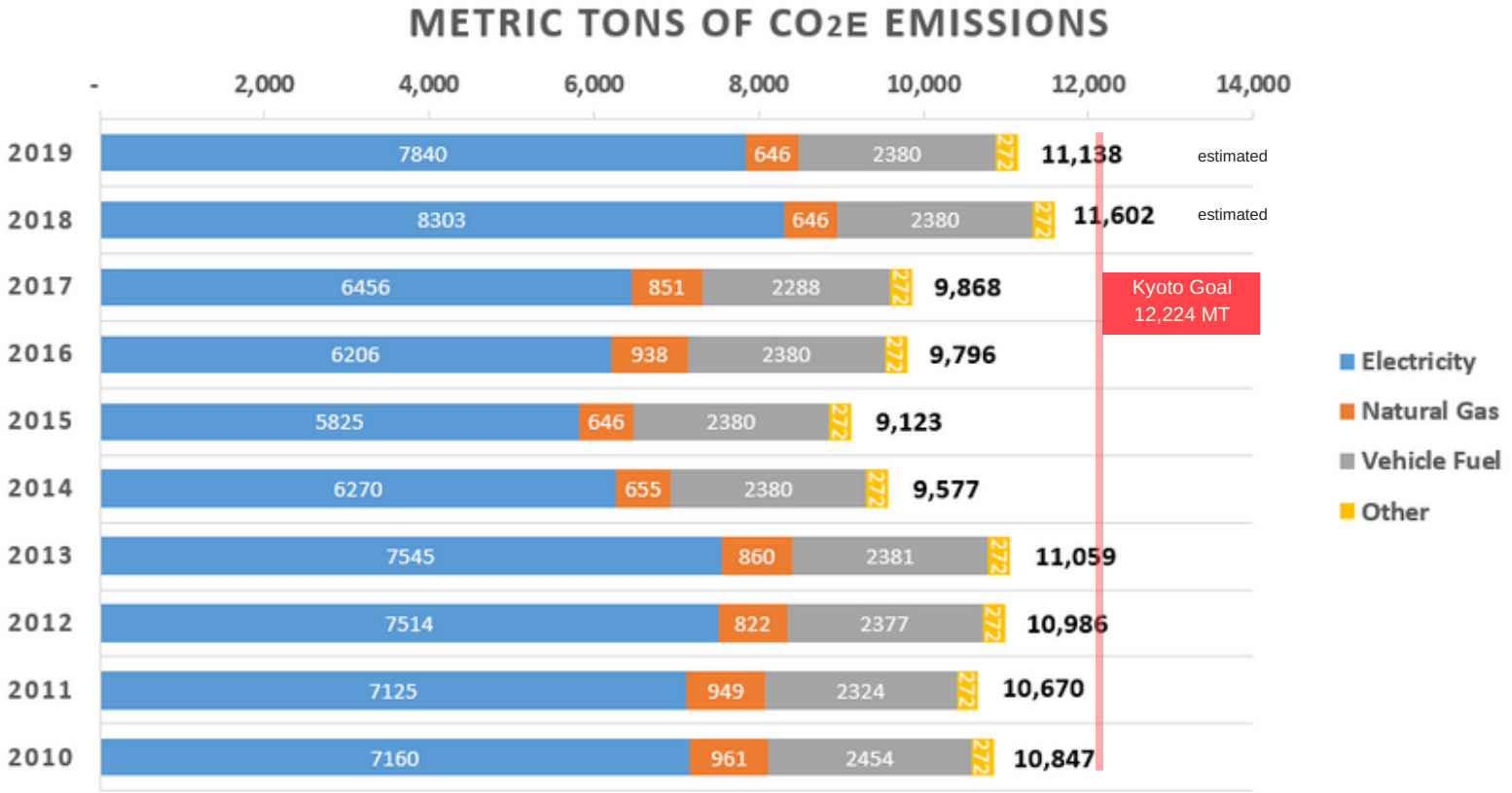


GHG Emissions

Greenhouse Gas Emissions

The City calculates it GHG emissions annually based on electricity and natural gas usage as well as vehicle fuel used. The results are then reported to the Climate Registry.

The City has exceeded emissions reduction goals set forth by the Kyoto Protocol (20% below 1990 levels) since 2007, however, Desal is expected to increase our overall GHG emissions due to the energy intensive nature of this system.



Greenhouse Gas Emissions and City Operations

Energy Conservation

Energy Conservation

The Energy Team is always looking for opportunities for reducing energy use via energy efficiency projects, such as lighting upgrades and to apply new technologies, such as building automation systems. It is always our priority to make our buildings as energy efficient as possible.

The team also takes advantage of incentive programs provided by the utility to maximize return on conservation efforts whenever possible.

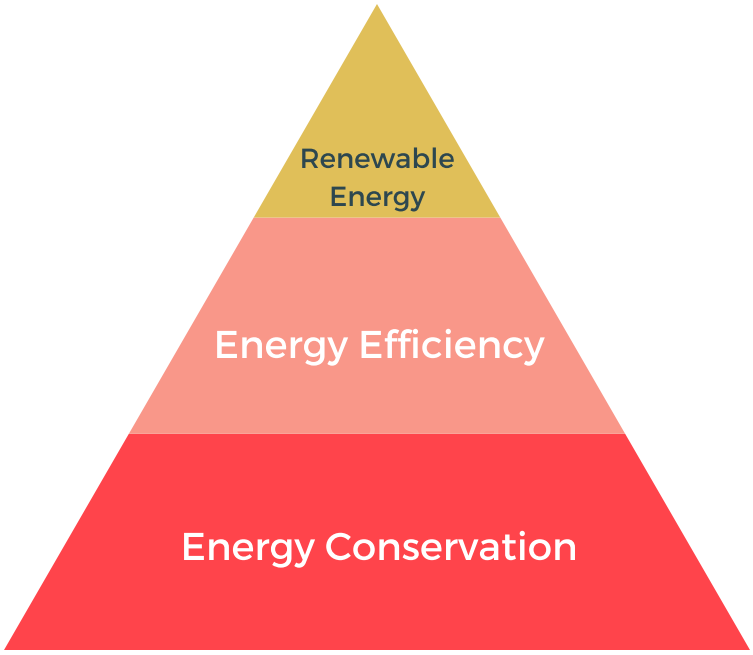
When the Energy Team designs energy conservation projects, we try to maximize:

- Energy Savings
- Operational Savings
- Maintenance Savings
- Deferred Maintenance Reduction – targeting building systems that need to be replaced due to age

What We Did in FY 2017

Project Highlights

Granada Garage Lighting Upgrade
Haley Streetlight Upgrade
Central Library Lighting Upgrade
Los Baños Deck Lights
Los Baños Pool Cover
Carrillo Recreation Stage Lights



Smart Energy Pyramid - Energy Priorities

Success Stories

Granada Lighting Upgrade

Lighting Upgrade

GRANADA GARAGE

- $22,183 Incentive Funding
- 121,184 kWh Energy Savings (Annual)
- $17,000 Annual $ Savings
- Improved Light Quality
- $77,000 On Bill Financing
- Increased Safety

The lighting at the Granada Garage (Parking Lot 6) was upgraded to new LED fixtures that include a multi-level capability. This unique features allows the fixtures to dim down when no movement is detected (when no one is around) and then immediately get brighter when someone walks or drives into the area.

The dimming function of these lights results in significant energy savings for the garage and contributes to this project's quick 5-year payback.

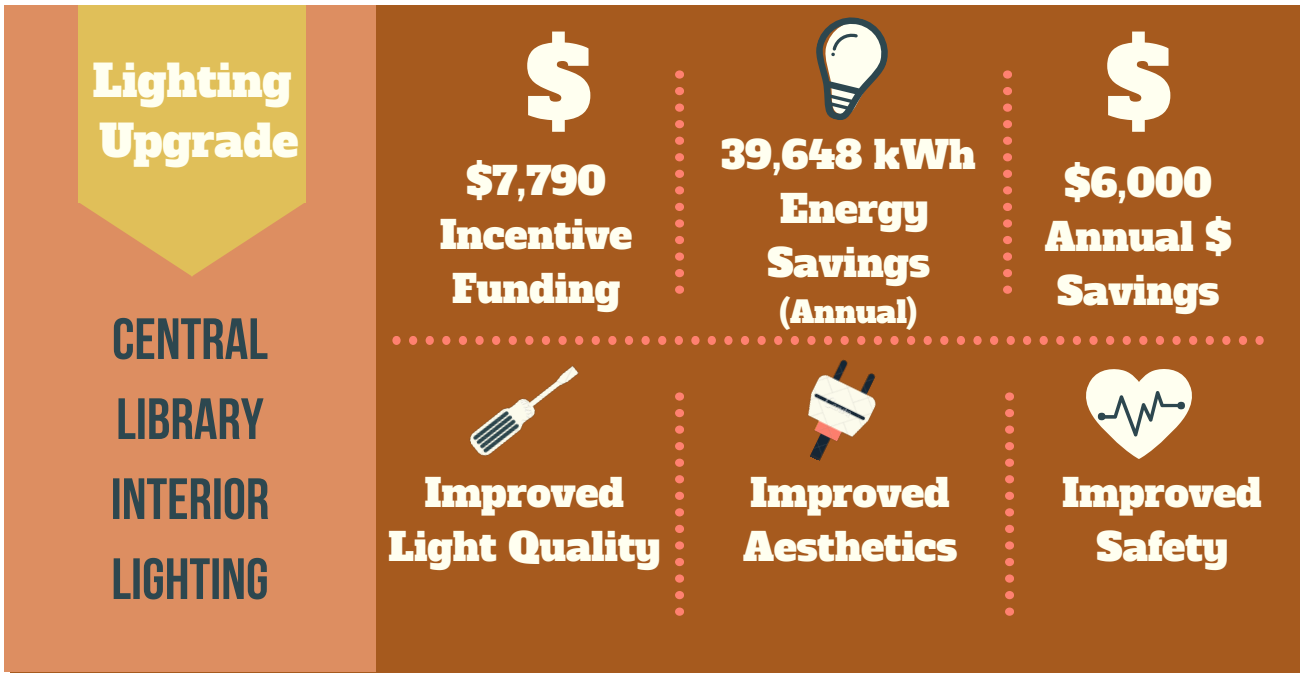
This upgrade also improved light distribution in the garage and increased security at the garage.

The lights were purchased with On Bill Financing, a utility program that provides no-interest loans for energy efficiency projects. Therefore, there was little capital outlay for the new and improved lights.

New lights at the Granada Garage

Success Stories

Library Lighting Upgrade



Santa Barbara's Central Library has been undergoing a major transformation in recent years. The Library has added a state of the art children's section, increased technology access and enhanced layout for today's modern literacy needs.

In keeping with these bold efforts, the City upgraded the outdated lighting with high-efficiency LED fixtures that improved light distribution and quality. Staff focused particularly on accommodating the Library's revised layout and eliminating dark spots.

The addition of lighting controls such as daylight harvesting and motion sensors also improves the energy efficiency of the library while reducing energy waste.

New lights at the Central Library

Success Stories

Rate Restructuring

With the launch of the UMP the Energy team did an in depth audit of all of the City's 500 electrical accounts to ensure that they were on the correct electrical rate

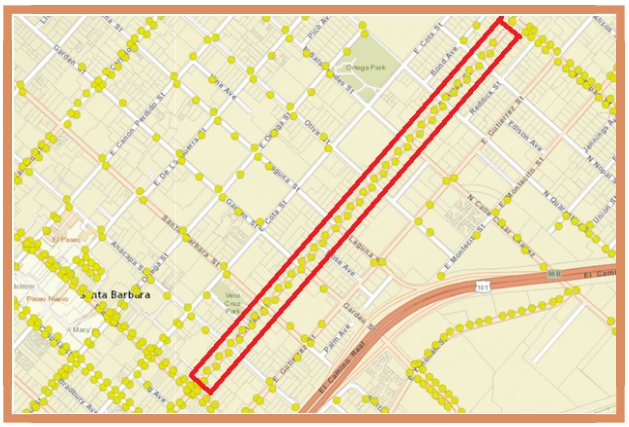
In FY2017 the City realized the benefit of these rate changes, saving nearly $200,000 despite energy use increasing.

Staff continues to analyze accounts by time of use as well as assigned load to make sure that they are on the most economical tariff.

Utility Management Program

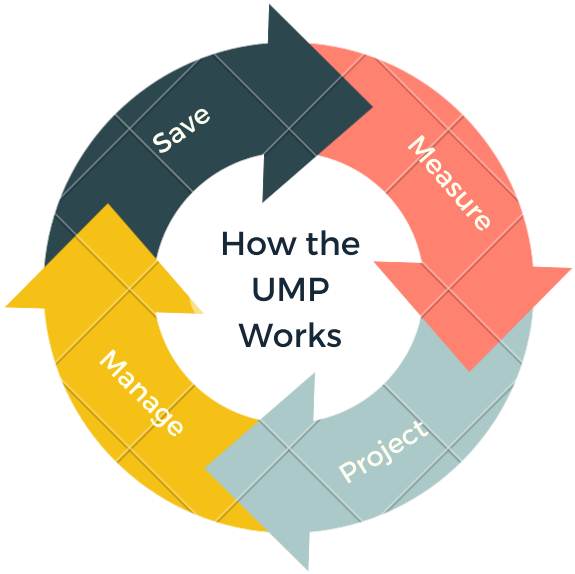
The Utility Management Program launched in fiscal year 2017. It is a program within the Facilities & Energy Division setup to manage and pay all General Fund utility bills (electric & gas)

The UMP centralizes management and analysis of over 650 City accounts and leverages cost savings from General Fund energy projects to build revolving fund to be reinvested in future energy projects.



Haley St Streelight Upgrade Corridor - paid for with UMP seed funding

UMP Flow Chart



The UMP started with a budget of $1,270,000 for FY17. Despite 6% electrical rate increases the electricity budget remains positive with minimal savings generated from electricity accounts. However, $86,000 in natural gas savings were achieve and reinvested into energy projects for FY18.

Reinvesting in Energy Efficiency

Looking ahead, the City plans to utilize any additional funding from UMP rollover savings, incentives, rebates, and potential additional General Fund funding to boost the City's energy efficiency while improving facilities.

The Energy Team has put together a list of priority projects that would have swift paybacks, further growing the UMP's revolving fund.

2017 Energy Team Savings

The Energy Team endeavors to reduce the City's energy use and costs through a variety of ways, including:

- Energy Conservation Projects
- Rate Changes
- Grants
- Rebates/incentives
- Strategic Planning Funds

In FY 17 the Energy Team applied for and received $35,700 in utility rebates and over $150,000 in On Bill Financing for a streetlight upgrade.

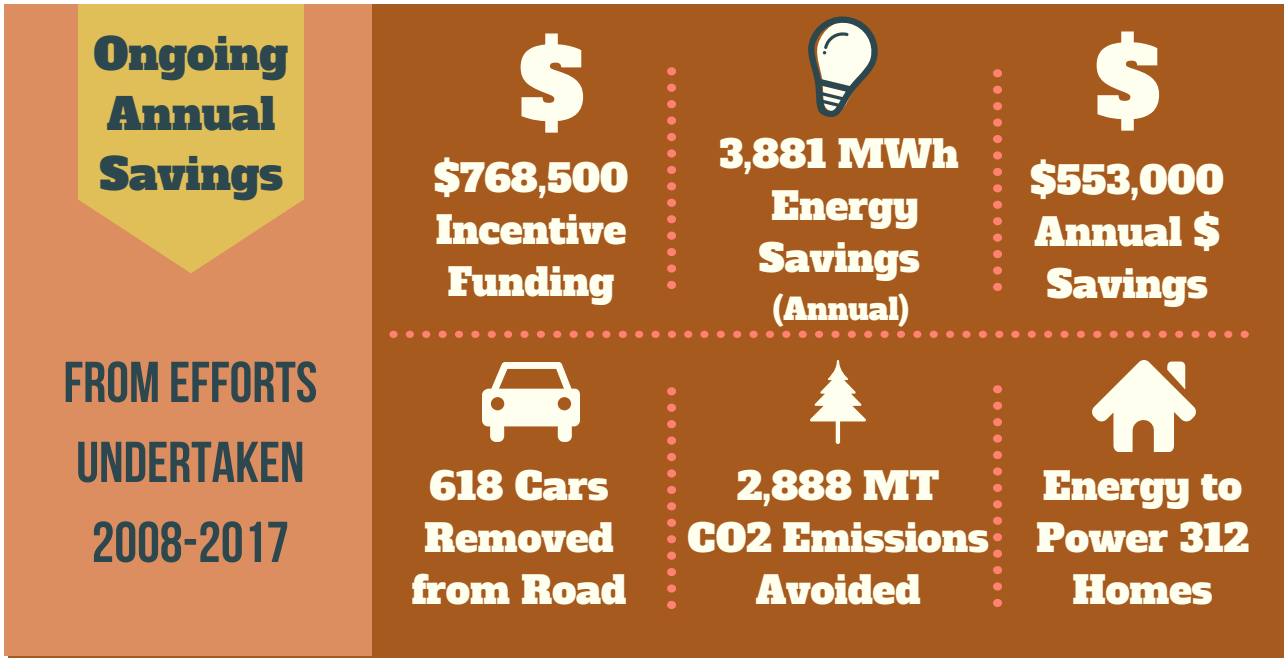
Staff is always looking for new opportunities to improve energy conservation and efficiency. The development and implementation of the UMP will greatly help the team undertake new projects that will further work toward the City's energy goals.

Priority Energy Projects for FY18

- Police Department Interior Lighting Retrofit
- 630 Garden Interior Lighting Retrofit
- Fire Stations Interior Lighting Retrofit
- Remaining LED Streetlight Retrofits
- Police Department Roof Insulation

Future Energy Projects

City-Wide Streetlight Upgrade
Airport Solar Array
ZNE Roadmap
Santa Barbara Strategic Energy Plan
City-wide Interior Lighting Upgrades
City Hall Lighting Upgrade
State Street Lighting Upgrade



Acknowledgements

There are many people that contribute to the City's energy efforts and many of our accomplishments would not be possible without the efforts of energy champions throughout the City.

Special Thanks to:

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Mike Wiltshire
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Greg Corral

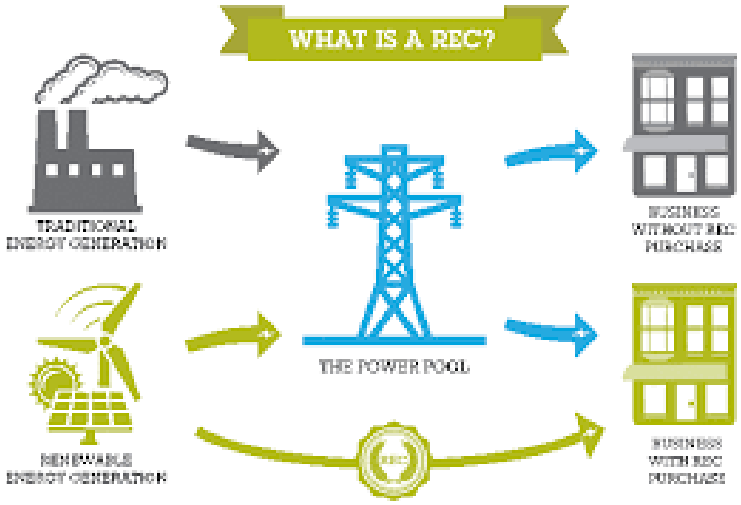
Renewable Energy Credits

Appendix 1

Renewable Energy Credits (RECs) represent the renewable component of renewable energy and can be sold, bartered or traded to entities that need to claim a portion of their energy use as "renewable."

Owning RECs allows the owner to claim the renewable benefit of the energy, regardless of whether it was generated at their facility or not. However, if you have a facility that generates renewable energy and sell or trade the RECs, you are no longer able to claim the energy you produce as renewable.

It remains unclear whether the value of RECs will increase or decrease over time, though they are likely to decrease as they are phased out of the Renewable Portfolio Standard which applies to all Investor-owned utilities and CCEs. Unbundled RECs can only account 10% or less of renewable energy supply now through 2020 and they are anticipated to be eliminated completely from RPS after 2020



Because the value of RECs can be volatile many public agencies often leverage the potential value of RECs in exchange for lower energy costs. As of 2015, approximately 65% of Power Purchase Agreements (PPA) nationwide assign the RECs to the PPA provider*.

RECs will likely continue to have a role for companies and public agencies who have aggressive renewable energy goals. For areas where it is difficult to offset energy usage, RECs can provide a balancing benefit.

*NREL: Status and Trends in the U.S. Volunteer Green Energy Power Market (2015 Data)

HYDRO

The City is participating in the CREST tariff at the hydro facility which allows the City to generate significant revenue by selling the energy, at a higher rate than a general feed-in tariff. SCE then includes the RECs in its renewable energy portfolio to comply with state renewable mandates. However, since SCE is claiming this energy in their renewable mix, the City cannot also claim the energy as "renewable."

COGEN

The City opted to forgo ownership of RECs for Cogen in order to negotiate a lower fixed energy rate over a 20 year period. In other words, the City chose to take advantage of long term rate savings rather than speculate on the future value of RECs.

Appendix 2

Our road to 100% Renewable

Constraints

Power Wheeling

Wheeling power refers to a situation where renewable energy is produced at one location and then credited to a different location. This would greatly help the City as our opportunities for renewable systems are not where our largest loads are. This would allow us to build renewable generation and wheel it to areas of high load, for example the desal plant. Currently wheeling power is prohibitively expensive and difficult to achieve.

Future of Electricity Procurement

The City currently procures its electricity from Southern California Edison but is participating in a Community Choice Energy (CCE) feasibility study.

Not knowing where the City will be procuring its electricity from in the near future makes it difficult to commit to some renewable alternatives, such as community energy.

Capital Funding

The City could easily achieve 100% renewable electricity by purchasing the Cogen (or other RECs). However, these purchases would come at a premium over existing electrical expenditures.

Additionally, energy efficiency project and some renewable energy project require capital funding. These projects typically pay back relatively quickly but do require up front outlays.

Opportunities

Community Choice Energy

Community Choice Energy (CCE) would allow local control over energy sourcing and pricing. This could greatly impact the City's ability to afford, incentivize, and source 100% renewable power.

The City is currently participating in a multi-jurisdictional feasibility study to assess how CCE would work locally. Results of the study will be available in the beginning of FY17

Zero Net Energy Study and Plan

Energy staff is planing to undergo an extensive Zero Net Energy Roadmap which will provide a comprehensive list of prioritized energy projects (both energy efficiency and renewable measures) to get the City's facilities to energy neutrality.

This project will include building benchmarking, in depth energy audits, and an economic study to incorporate potential projects in the City's Utility Management Program Revolving Fund.

Energy Efficiency Revolving Fund

One of the most actionable ways to achieve 100% renewable power is to maximize energy efficiency. The City is always looking for opportunities to reduce energy usage and the development of the Utility Management Program which acts as a revolving fund focusing on funding energy efficiency and conservation projects.

Appendix 3

Renewable Energy Generation

Renewable energy generation represents a substantial and growing part of the City's energy efforts. The City currently generates over 5 Million kWh of renewable energy at its facilities, equivalent to 19% of the City's energy usage. This number will almost double as the hydro-electric plant located at Lauro Reservoir comes online and begins producing electricity in 2017.

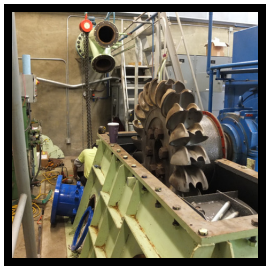
The City generates substantial renewable energy, although it cannot claim some of this energy as renewable according to industry standards . For example, the City did not retain the Renewable Energy Credits to the Hydro and Cogen facilities and, therefore, cannot count the energy generated by these facilities in its renewable percentage. This will be explained more on page 9.

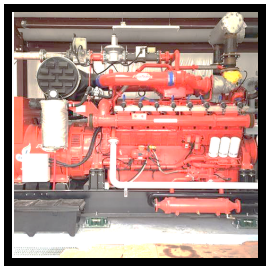
Because the City is being asked to set a renewable energy goal for its operations, staff is taking this time to adjust our metrics to align with industry standards and true up our energy accounting to match changing energy markets. Therefore, the City's claimable renewable energy percentage is 30%.

These renewable sources include solar generation and Southern California Edison renewable sources, which accounts for 28% of SCE's power mix. If the City chose to purchase the renewable energy credits (see explanation below) associated with cogen the renewable percentage would be 42%

The City has four on-site solar arrays. These systems provide a total annual generation of 780,000 kWh - enough energy to power 100 local area homes.

The Hydro facility located at Lauro reservoir is capable of producing 1,874 MWh of power – enough to power about 300 homes. This plant is expected to generate about $200k per year for the City.





The Cogen plant at El Estero produces about 3,000 MWh of renewable energy annually. The system has resulted in significant $ savings at the plantl. Also, methane is no longer flared off and is instead used to make energy.